

3M Purification

Life Sciences Process Technologies Product Brochure



Betafine™ PPG Series Cartridges and Capsules

Polypropylene absolute-rated
graded-density filters





Polypropylene pleated graded-density filter cartridges featuring APT construction for extended filter lifetime

3M Purification's Betafine™ PPG Series filter cartridge, formerly known as PolyPro XL, represents a major advance in pleated polypropylene filter design and performance. Advanced Pleat Technology (APT) construction combines:

- up to 50% more filter media (surface area) than competitive filters,
- graded-density media for optimum contaminant holding,
- new cartridge design for increased flow and reduced pressure drop.

The result is a filter cartridge that lasts longer, performs better and saves money.

Betafine PPG Series filters for pharmaceutical and biotechnology applications are available in the following versions:

- model PPG, delivered with quality control certificate,
- model PTG with factory certified integrity testing.



The APT advantage

Surface area dictates just how long a filter will last and how it will perform. However, increasing surface area without considering the flow path between the media's pleats could result in flow restrictions and early media blinding. To achieve the optimum between surface area and performance, 3M Purification has designed Betafine PPG Series so that the pleating process and media support materials work together to provide enhanced flow characteristics and longer service life.

Features and benefits

Advanced Pleat Technology construction for extremely high surface area

- Higher product throughputs for extraordinarily long service life
- Lower total filtration operating costs
- Lower pressure drops for higher flow rates

Absolute-rated filter performance

- Consistent and reproducible contaminant removal
- Higher product quality and yields

Graded-density multi-layer filter media

- Selective entrapment of contaminant throughout the filter media to maximise filter life
- Higher contaminant holding capacity

Polypropylene cartridge components free of adhesives and surfactants

- Very low extractable levels for optimum filtrate purity
- Broad chemical compatibility for most aggressive process applications

100% integrity tested versions available

- Assurance of safety and regulatory compliance in pharmaceutical, bioprocessing and biological filtration
- Pre-qualification and assurance in critical applications
- Suitable for final filtration in many applications

Robust polypropylene cartridge construction

- Extends service life and compatible with a wide range of solvents and cleaning solutions

Capsules and mini-cartridges available

- Sanitary capsule vent and drain valves ease use
- Steam sterilisable mini-cartridges

Mini-cartridges and capsules

Betafine™ PPG capsule and mini-cartridge filters contain pleated, graded density, absolute-rated, polypropylene filter media providing excellent retention of particles at fast flow rates. The all-polypropylene construction offers superior chemical resistance and durability in demanding process applications.

Constructed with the Advanced Pleat Technology (APT) combining high filter surface area with graded-density filter media structure, Betafine PPG capsule and mini-cartridge filters flow faster and last longer than competitive filters.

Betafine PPG mini-cartridges can be installed in existing competitor housings or in the 3M Purification mini-cartridge housing. Betafine PPG mini-cartridges provide significant flow advantages compared to competitive offerings resulting in greater batch capacity and reduced filter change-outs.

Graded-density - the key to longer life

The Betafine PPG Series filter's graded-density media structure removes particles sequentially by size - the larger particles by the more open, outer medium and the smaller particles by the tighter, inner medium. The outer medium acts as a prefilter, while the inner provides the absolute removal specified by the cartridge rating. This construction effectively spreads the contaminant through the depth of the filter media resulting in extremely high contaminant capacity with lower pressure drop for longer service life.

Chemical compatibility

Polypropylene construction provides chemical compatibility in many demanding process fluid applications. Compatibility is influenced by process operating conditions. In critical applications, cartridges should be tested under actual conditions to ensure correct selection.

Flow characteristics and sizing options

Reduced cartridge change-out frequency

For a given process flow rate, the graded-density structure and maximum filter area decrease filter cartridge change-out frequency by 30 to 50 percent or more depending on the application.

Reduced filter housing costs

For new applications, the low pressure drops of the Betafine PPG Series filter allow smaller or fewer housings to be specified. Fewer filter cartridges and smaller housings provide lower capital and consumables costs, year after year.

Ideally, filter systems should be sized at an initial differential pressure of 0.04 to 0.07 bar. Low flow rates further extend the life of the filter system. In most applications, doubling the filter area (reducing the flow rate per unit area by one-half) results in two and one-half times the throughput.

Flow rates mini-cartridges and capsules

The figures on the next page are typical water flow rates for Betafine PPG capsules with 1 ½" sanitary flange connections or in the mini-cartridge configuration. Other end connections will effect maximum flow rates (see table on the next page).

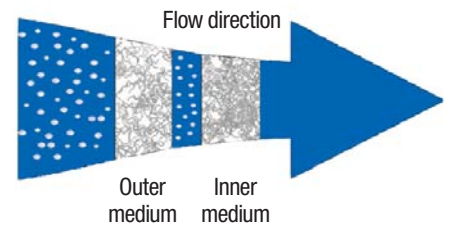
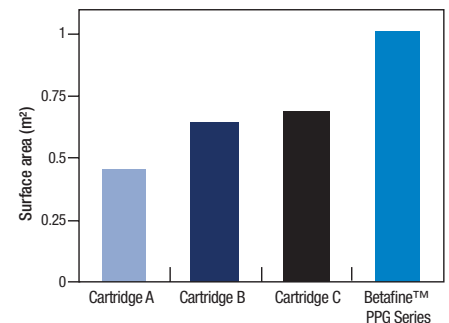


Figure 1: Surface area comparison



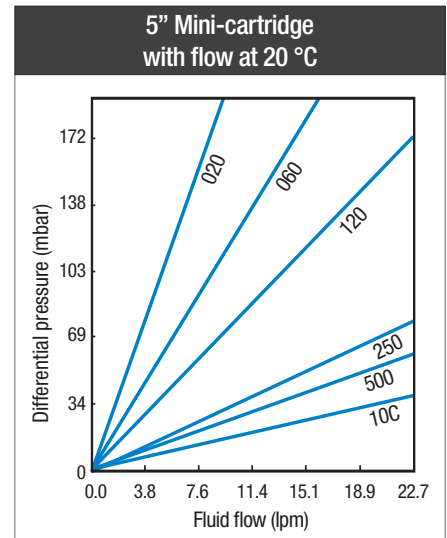
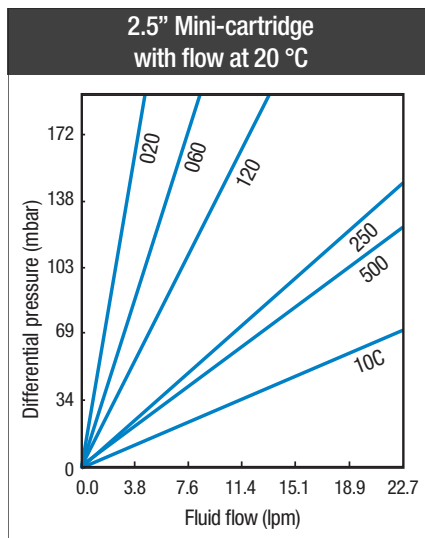
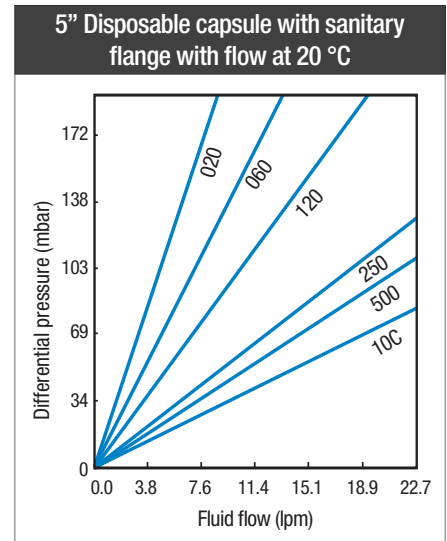
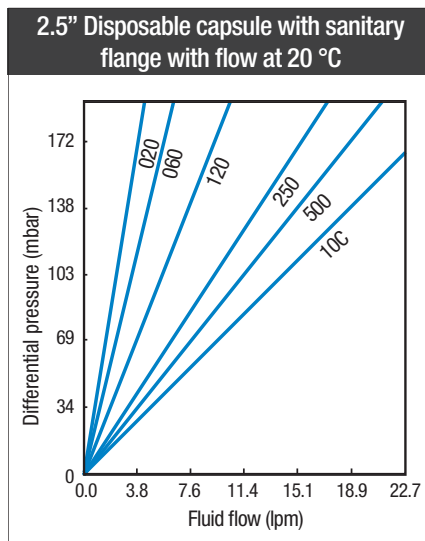
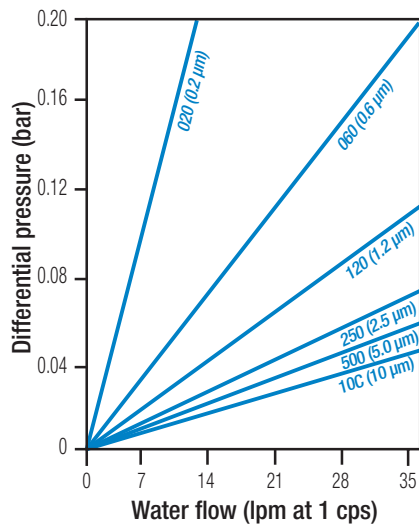
Maximum recommended capsule flow by end connection

	Maximum recommended flow rate (litres/min.)	Housing pressure loss (mbar)*
1½" Sanitary flange	22.7	69
3/8" FNPT	22.7	69
½" Hose barb	11.4	103
1/4" MNPT	5.7	165
Tapered hose barb	1.9	152

* At maximum recommended flow rate

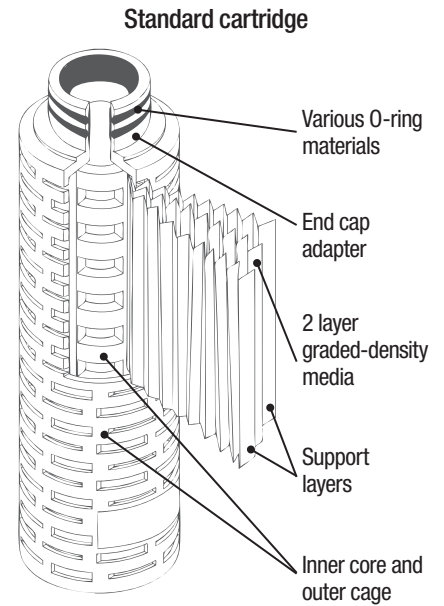
Figure 2: Flow vs. differential pressure

Clean water flow per 10" cartridge at ambient temperature (20 °C)



Betafine PPG filter cartridge specifications

Materials	
Media	Graded-density pleated polypropylene
Supports	Polypropylene
Core, cage and end caps	Polypropylene
Gasket and O-ring options	Silicone, fluorocarbon, ethylene propylene, nitrile
Operating conditions	
Maximum operating temperature	60 °C continuous 80 °C short term
Maximum forward differential pressure	4 bar at 25 °C
Maximum reverse differential pressure	4 bar at 25 °C
Cartridge dimensions	
Media area versions	1 m ² 10 micron cartridge has media area of 0.6 m ²
Diameter	7 cm
Length	Nominal 10", 20", 30" and 40"

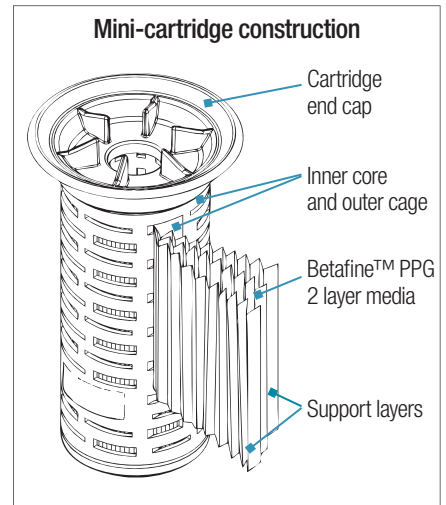
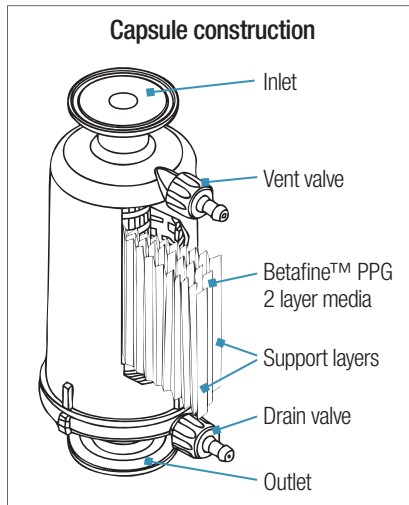


Betafine PPG mini-cartridge and capsule specifications

Operating conditions		
Maximum capsule operating pressure	5.2 bar	
Maximum differential pressure	Forward: Capsules and mini-cartridges: 4.1 bar at 40 °C Mini-cartridges: 2.4 bar at 80 °C	
	Reverse: 2.4 bar at 25 °C	
Recommended change-out differential pressure	2.4 bar	
Maximum operating temperature	Mini-cartridges: 80 °C	
	Capsules: 40 °C - DO NOT <i>IN SITU</i> STEAM	
Surface area by grade	2.5" length	5" length
020 (0.2 µm)	0.13 m ²	0.27 m ²
060 (0.6 µm)	0.14 m ²	0.30 m ²
120 (1.2 µm)	0.14 m ²	0.30 m ²
250 (2.5 µm)	0.14 m ²	0.30 m ²
500 (5.0 µm)	0.13 m ²	0.28 m ²
10C (10 µm)	0.08 m ²	0.18 m ²
Materials of construction		
Filter media and support layers	Polypropylene	
Capsule body	Polypropylene	
Mini-cartridge cage, core and end caps	Polypropylene	
Capsule vent/drain O-rings	See ordering guide	

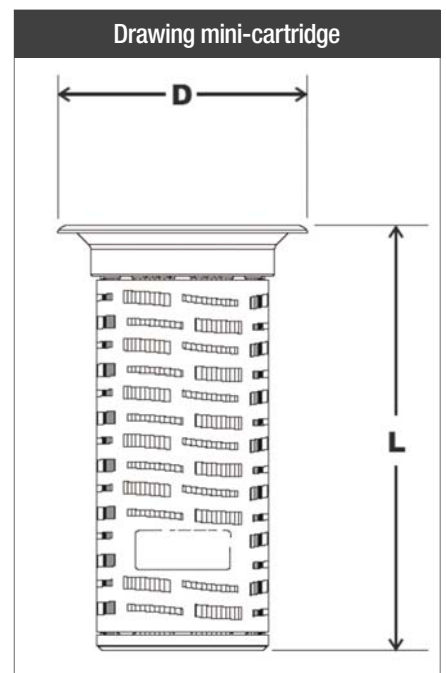
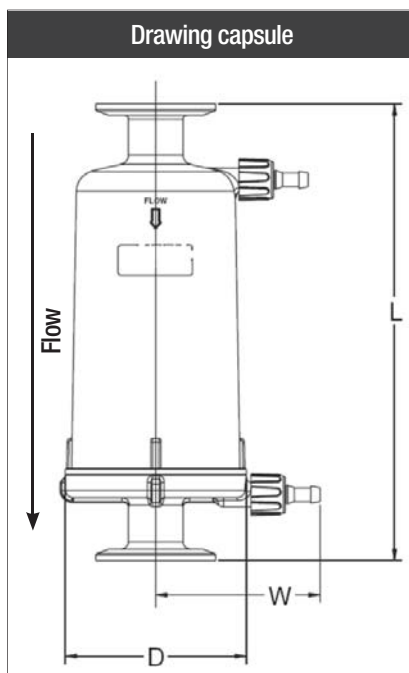
ISO Quality System

Betafine™ PPG Series filter cartridges are manufactured under an ISO certified quality system. The quality system ensure that appropriate standards are met or exceeded to provide consistent, high quality products.



Nominal capsule dimensions						
Dimensions (see figure below)	Nominal length (see ordering guide)	With end connections* (inches)				
		A	B	C	D	E
Length (L)	01	5	5 ½	5	5	5 ¼
	02	7 ½	8	7 ½	7 ½	7 ¾
Diameter (D)	01	3				
	02					
Width to vent (W)	01	2 ¾				
	02					

Nominal mini-cartridge dimensions		
Dimensions (see figure below)	2.5" mini-cartridge	5" mini-cartridge
Length (L)	3 ⅛	5 ½
Diameter (D)	3 ¼	



The Betafine PPG Series filtration advantage

In applications such as biological feed streams, serial filtration is often employed for economical filterability. A typical configuration could be a 0.6 µm Betafine™ PPG Series prefilter upstream of a 0.2 µm rated sterile membrane filter cartridge. In those instances where greater membrane protection is required, a 0.6 µm or a 0.2 µm rated Betafine PPG Series filter will provide longer final membrane life than competitive 0.6 µm rated products. The high surface area of Betafine PPG Series filters coupled with graded-density construction allows the process to run for extended periods of time before filter plugging and change-out.

Betafine PPG Series filters - engineered for pharmaceuticals and bioprocessing

Constructed from polypropylene media and support materials, the Betafine PPG Series series has ultra-low extractable levels and broad fluid compatibility, providing an ideal choice for a broad range of pharmaceutical applications. Betafine PPG Series filters can be used for general prefiltration, clarification or as a final filter in appropriate applications. All component materials meet the requirements of USP Class VI Biological Tests for Plastics. Betafine PPG Series cartridges may be autoclaved or steamed-in-place (*in situ*). Two versions of the pharmaceutical grade Betafine PPG Series filters are available - models PPG and PTG. Both are supplied with quality certificates detailing the product attributes and qualification testing. Model PTG is integrity tested prior to shipment for applications where “factory integrity tested” provides added assurance.

- **Safety** - All component materials meet the requirements of USP Class VI Biological Tests for Plastics
- **Sterilisable** - may be autoclaved or steamed-in-place (*in situ*)
- **Certificate of Quality** details the product attributes and qualification testing

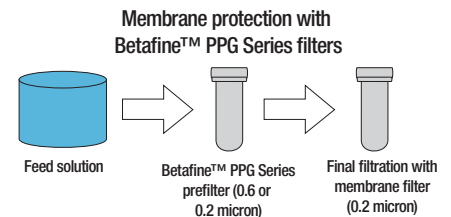
Pharmaceutical, bioprocess and biological applications

Betafine™ PPG Series filter cartridges serve a broad range of prefiltration and clarification applications in pharmaceutical, biological and bioprocess manufacturing where economy and reliability are critical. Recommended applications include:

- Parenterals (SVP and LVP), membrane protection, ophthalmics, orals, topicals, vaccines and serum
- Tissue culture media, fermentation feeds and intermediates
- Rinse fluids and pharmaceutical fine chemicals
- Blood plasma fractionation
- Reagents and buffers, high purity water systems, air and gas pre- and final filtration
- Diagnostics
- Cosmetics manufacturing

Applications support - SASS

3M Purification’s Scientific Applications Support Services (SASS) is staffed by scientists and engineers, with state-of-the-art laboratory facilities. The SASS staff, familiar with a wide range of filtration and separation applications, work closely with the customer to recommend the most effective and economical 3M Purification filtration systems.



Betafine™ PPG Series filter cartridges - Ordering guide

Model	Absolute rating***	Configuration	Nominal length	End modification	Gasket/O-ring material
PPG	020 * : 0.2 µm	B - Cartridge 2.8" (7.1 cm)	01 : 10"	B - 226 O-ring with spear	A - Silicone
PTG **	060 : 0.6 µm		02 : 20"	C - 222 O-ring with spear	B - Fluorocarbon
	120 : 1.2 µm		03 : 30"	D - DOE flat gasket (10")	C - EPR
	250 : 2.5 µm		04 : 40"	E - DOE flat gasket (9 ¾")	D - Nitrile
	500 : 5.0 µm			F - 222 O-ring with Flat Cap	H - Clear silicone
	10C : 10.0 µm				

* PTG020 not available with D and E end modifications.

** Available in 060 (0.6µm) and 120 (1.2µm) ratings only.

*** Retention ratings determined by modified ASTM STP 975. The 0.2 micron rating has been extrapolated. For more information, contact your 3M Purification representative.

Note: Betafine PPG Series is new name for CUNO PolyPro XL PB.

Betafine™ PPG Series mini-cartridges - Ordering guide

Model	Absolute rating	Configuration	Nominal length	End modification	Vent O-ring option	Packaging code option
PPG	020 : 0.2 µm	M - Mini-cartridge	01 : 2 ½"	A - Standard	N - None	06 : 6 pack
	060 : 0.6 µm		02 : 5"			
	120 : 1.2 µm					
	250 : 2.5 µm					
	500 : 5.0 µm					
	10C : 10.0 µm					

Betafine™ PPG Series filter capsules - Ordering guide

Model	Absolute rating	Configuration	Nominal length	End modification	Vent O-ring option	Packaging code option	
PPG	020 : 0.2 µm	C - Capsule	01 : 2 ½"	A - 1 ½" sanitary flange	A - Silicone	01 : single pack	
	060 : 0.6 µm		02 : 5"	B - ½" (14 mm) hose barb		B - Fluorocarbon	02 : 3 pack
	120 : 1.2 µm		C - ¼" MNPT	C - EPR		03 : 20 pack	
	250 : 2.5 µm		D - 3/8" FNP				
	500 : 5.0 µm		E - ¼"- 5/16"- 3/8" tapered hose barb				
	10C : 10.0 µm						

Important Notice

The information described in this literature is accurate to the best of our knowledge. A variety of factors, however, can affect the performance of the Product(s) in a particular application, some of which are uniquely within your knowledge and control. INFORMATION IS SUPPLIED UPON THE CONDITION THAT THE PERSONS RECEIVING THE SAME WILL MAKE THEIR OWN DETERMINATION AS TO ITS SUITABILITY FOR THEIR USE. IN NO EVENT WILL 3M PURIFICATION BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON INFORMATION.

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